

CLAIMS

What is claimed is:

1. A method of managing dormant handoffs of mobile stations at a wireless communication network Base Station (BS), the method comprising:

initiating dormant handoff of a mobile station that is undergoing a packet data mobility event responsive to receiving a first dormant handoff request from the mobile station for a first packet data service instance of the mobile station; and

recognizing that the mobile station has additional packet data service instances requiring dormant handoff and selectively assigning a traffic channel to the mobile station to cause the mobile station to send additional dormant handoff requests for the additional packet data service instances over the assigned traffic channel.
2. The method of claim 1, wherein recognizing that the mobile station has additional packet data service instances requiring dormant handoff comprises receiving a multiple service instance indicator in a message returned by a Packet Control Function (PCF) in response to the BS initiating dormant handoff of the mobile station.
3. The method of claim 1, wherein selectively assigning a traffic channel to the mobile station comprises assigning the traffic channel if a total number of multiple service instances for the mobile station exceeds a threshold.

4. The method of claim 1, wherein selectively assigning a traffic channel to the mobile station comprises assigning the traffic channel if the mobile station has two or more packet data service instances.
5. The method of claim 1, wherein selectively assigning a traffic channel to the mobile station comprises selectively assigning or not assigning a traffic channel to the mobile station based on resource availability at the BS.
6. The method of claim 5, wherein selectively assigning a traffic channel to the mobile station comprises selectively assigning or not assigning a traffic channel to the mobile station further based how many additional packet data service instances the mobile station has.
7. The method of claim 1, further comprising counting subsequent dormant handoff requests sent by the mobile station over the assigned traffic channel and releasing the traffic channel once the count equals the number of additional packet data service instances.
8. The method of claim 1, wherein receiving a first dormant handoff request from the mobile station for a first packet data service instance of the mobile station comprises receiving an Origination message from the mobile station over a common access channel of the BS.
9. The method of claim 8, further comprising receiving the additional dormant handoff requests as Enhanced Origination messages from the mobile station over the assigned traffic channel.

10. The method of claim 8, further comprising determining that the Origination message is a dormant handoff request by inspecting a data ready/not ready indicator in the Origination message.

11. The method of claim 1, further comprising initiating dormant handoff of each additional packet data service instance responsive to receiving each additional dormant handoff request.

12. The method of claim 11, wherein receiving each additional dormant handoff request comprises receiving an Enhanced Origination message for each additional dormant handoff request over the assigned traffic channel.

13. The method of claim 1, wherein recognizing that the mobile station has additional packet data service instances requiring dormant handoff and selectively assigning a traffic channel to the mobile station comprises retaining information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station.

14. The method of claim 13, wherein retaining information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station comprises retaining a service instance count based on the number of A10 data connections handed off for the mobile station.

15. The method of claim 14, further comprising running a timer upon releasing a traffic channel associated with the prior hard handoff of the mobile station and using the retained service instance count as the number of packet data service instances

associated with the mobile station if a dormant hard handoff request is received from the mobile station before expiration of the timer.

16. The method of claim 13, wherein retaining information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station comprises retaining service instance information received from a source BS during the prior hard handoff of the mobile station.

17. A method of managing dormant handoffs of mobile stations at a wireless communication network Packet Control Function (PCF), the method comprising:
recognizing that a mobile station undergoing dormant handoff has multiple
packet data service instances; and
sending an indication of the multiple packet data service instances to a Base
Station (BS) supporting the dormant handoff of the mobile station.

18. The method of claim 17, wherein the BS assigns a traffic channel to the mobile station responsive to receiving the indication from the PCF, and further comprising suppressing a subscriber accounting message that is normally sent by the PCF to a Packet Data Serving Node (PDSN) as part of assigning traffic channels to mobile stations.

19. The method of claim 18, further comprising sending a subscriber accounting message responsive to detecting data transfer to or from the mobile station for any packet data service instance.

20. The method of claim 17, wherein recognizing that a mobile station undergoing dormant handoff has multiple packet data service instances comprises recognizing an indication of multiple packet data service instances in a registration reply message returned by a Packet Data Serving Node (PDSN) as part of re-registering a first one of the multiple packet data service instances.

21. The method of claim 20, wherein sending an indication of the multiple packet data service instances to a Base Station (BS) supporting the dormant handoff of the mobile station comprises passing the indication of the multiple packet data service instances received from the PDSN along to the BS unless the PCF has already set up an A8 connection for the mobile station.

22. The method of claim 17, wherein sending an indication of the multiple packet data service instances to a Base Station (BS) supporting the dormant handoff of the mobile station comprises sending a multiple service instance count to the BS.

23. The method of claim 17, wherein recognizing that a mobile station undergoing dormant handoff has multiple packet data service instances comprises using information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station.

24. The method of claim 23, wherein using information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station comprises using a service instance count based on the number of A10 data connections handed off for the mobile station.

25. A method of managing dormant handoffs of mobile stations at a wireless communication network Packet Data Serving Node (PDSN), the method comprising:
- receiving a registration request message for a first packet data service instance associated with a mobile station undergoing a dormant handoff;
 - determining that more than one packet data service instance is associated with the mobile station; and
 - sending an indication of multiple packet data service instances in a registration reply message responsive to the registration request message.
26. The method of claim 25, wherein the indication of multiple packet data service instances comprises a service instance count value included in the registration reply message, and wherein the service instance count value depends on a number of packet data service instances associated with the mobile station.
27. The method of claim 25, wherein sending an indication of multiple packet data service instances in a registration reply message responsive to the registration request message comprises including a multiple service instance count in the registration reply message.
28. The method of claim 25, further comprising suppressing the indication of multiple packet data service instances in subsequent registration reply messages corresponding to additional registration request messages received for any additional packet data service instances associated with the mobile station.

29. A method of improving dormant handoff of mobile stations in CDMA2000

wireless communication networks, the method comprising:

receiving a dormant handoff request from a mobile station for a first packet data service instance via a common access channel shared with other mobile stations;

determining whether the mobile station is associated with multiple packet data service instances; and

if the mobile station is associated with multiple packet data service instances, assigning a traffic channel to the mobile station to cause the mobile station to send additional dormant handoff requests for any additional packet data service instances via signaling on the assigned traffic channel.

30. A Base Station Controller (BSC) for use in a wireless communication network, the BSC comprising:
- a first interface to communicate with one or more Radio Base Stations (RBSs) that support wireless communication with a plurality of mobile stations;
 - a second interface circuit to communicate with a Packet Control Function (PCF) that provides a Radio-Packet (RP) interface between the BSC and a Packet Switched Core Network (PSCN); and
 - a control circuit to control dormant handoff of mobile stations, wherein the control circuit is configured to:
 - initiate dormant handoff of a mobile station that is undergoing a packet data mobility event responsive to receiving a first dormant handoff request from the mobile station for a first packet data service instance of the mobile station; and
 - recognize that the mobile station has additional packet data service instances requiring dormant handoff and selectively assign a traffic channel to the mobile station to cause the mobile station to send additional dormant handoff requests for the additional packet data service instances over the assigned traffic channel.
31. The BSC of claim 30, wherein the control circuit recognizes that the mobile station has additional packet data service instances requiring dormant handoff based on receiving a multiple service instance indicator in a message returned by the PCF in response to the BSC initiating dormant handoff of the mobile station.

32. The BSC of claim 30, wherein the control circuit selectively assigns a traffic channel to the mobile station based on determining whether a count of the packet data service instances exceeds a threshold.
33. The BSC of claim 30, wherein the control circuit selectively assigns a traffic channel to the mobile station based on assigning the traffic channel if the mobile station has two or more packet data service instances.
34. The BSC of claim 30, wherein the control circuit is configured to count subsequent dormant handoff requests sent by the mobile station over the assigned traffic channel and release the traffic channel once the count equals the number of additional packet data service instances.
35. The BSC of claim 30, wherein the control circuit receives a first dormant handoff request from the mobile station for a first packet data service instance of the mobile station based on the first interface receiving an Origination message sent from the mobile station over a common access channel supported by the BSC.
36. The BSC of claim 35, wherein the control circuit receives the additional dormant handoff requests based on the first interface receiving Enhanced Origination messages sent from the mobile station over the assigned traffic channel.
37. The BSC of claim 35, wherein the control circuit is configured to determine that the Origination message is a dormant handoff request by inspecting a data ready/not ready indicator in the Origination message.

38. The BSC of claim 30, wherein the control circuit is configured to initiate dormant handoff of each additional packet data service instance responsive to receiving each additional dormant handoff request from the mobile station.

39. The BSC of claim 38, wherein the control circuit receives each additional dormant handoff request comprises receiving an Enhanced Origination message sent by the mobile station over the assigned traffic channel for each additional packet data service instance.

40. The BSC of claim 30, wherein the control circuit is configured to recognize that the mobile station has additional packet data service instances requiring dormant handoff by retaining information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station.

41. The BSC of claim 40, wherein the control circuit is configured to retain information obtained during a prior hard handoff of the mobile station regarding a number of packet data service instances associated with the mobile station by retaining a service instance count based on the number of A10 data connections handed off for the mobile station.

42. The BSC of claim 41, wherein the control circuit is configured to run a timer after releasing a traffic channel associated with the prior hard handoff of the mobile station and use the retained service instance count as the number of packet data service instances associated with the mobile station if a dormant hard handoff request is received from the mobile station before expiration of the timer.

43. The BSC of claim 30, wherein the control circuit is configured to selectively assign a traffic channel to the mobile station to cause the mobile station to send additional dormant handoff requests for the additional packet data service instances over the assigned traffic channel based on resource availability at the BSC.